MAGSWITCH UR10 Isolated Magnet Base
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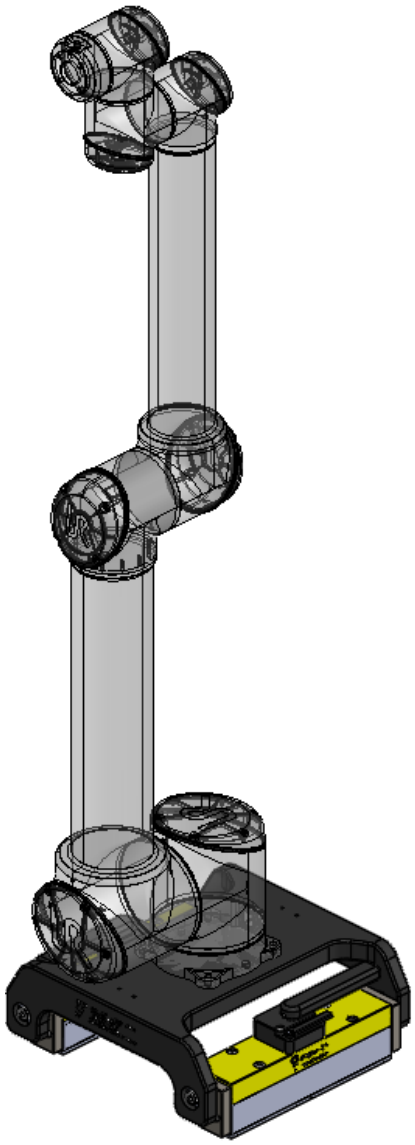
UR10 Isolated Cobot Magnet Base Operation Manual

Safety:



- Items or body parts between the gripping surface of the magnet and ferromagnetic material are at risk of crushing and impact forces.
- ***Never exceed the max rated load*** of the Magswitch magnet. This may result in an unsafe or dangerous condition.
- ***DO NOT attempt to disassemble or alter the device*** in any way. This will void the warranty and may result in an unsafe or dangerous condition. There are no user-serviceable components inside.
- ***Do no turn the magnet 'ON' unless it is in contact with ferromagnetic metal***. Actuation off-target will generate a strong, static, projected magnetic field which can accelerate, draw-in, and trap ferromagnetic material and damage magnetic storage media.
- ***Always inspect the tool*** to ensure that it is in good working order before and periodically during use.
- ***Avoid sudden jerking or shock force*** as this may exceed magnet holding capacity. Consider use of shear stops or other secondary methods, such as soft starts and stops to prevent loss of magnetic circuit.
- ***DO NOT Operate the Magnet at temperatures greater than 120°Fahrenheit (49°Celsius) for prolonged periods***.
- ***DO NOT expose standard Magswitch tools to temperatures above 176°Fahrenheit (80°Celsius)***. High temperatures will permanently degrade the Magnet's effectiveness and may result in an unsafe condition.
- ***Not recommended for painted or finish coated surfaces without proper testing and advice*** as these may reduce the magnetic bond, affecting lift and shear performance. The magnet may damage the surface finish. Contact supplier for air gap data.
- This product contains PTFE or Lithium based lubricant. For MSDS information contact Magswitch.

⚠ **WARNING:** This product can expose you to chemicals including nickel and tetrafluoroethylene, which are known to the State of California to cause cancer. For more information, go to www.P65Warnings.ca.gov

⚠ **WARNING:** This product can expose you to chemicals including toluene, which are known to the State of California to cause birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov

Operation:

To turn ON the magnet base:

- Position the magnetic base in contact with ferrous material such as carbon steel. The feet of both swiveling magnet assemblies should be flat on the surface and in intimate contact with the material. On curved or round surfaces, the notched feet of the swiveling magnet assemblies should match the contours of the object to which the magnet will be adhered.
    - Holding force decreases when surface contact decreases.
    - Holding force decreases when substrate material thickness decreases
    - Holding force decreases when there are "air gaps" such as paint buildup, rust, or nonferrous materials between the magnet and the ferrous surface
- Turn the knobs on both swiveling magnet subassemblies clockwise 180°. As the knobs are turned the knob assembly will make clicking noises as the ratchet pawl advances. The base can be shifted on the surface of the substrate while partially actuated. The magnet will not reach full strength until the knobs are rotated fully.
- In the ON state the actuation knob will point to the "MAX" engraving on the ratchet cover.
- Repeat for the second swiveling magnet assembly on the other side of the base.

To turn the magnet OFF:

- Press the secondary lever at the base of the primary knob/ratchet cover near the yellow surface of the magnet topcap.
- Simultaneously, rotate the primary knob counterclockwise 180° until the knob points to the "OFF" engraving on the ratchet cover.
    - WARNING: the knob can rotate backwards rapidly if the substrate material is thin (or not present).
    - IF for some reason the magnet was actuated off-target or if the magnet was peeled from a thin substrate, take care to not get fingers caught between the actuation knob/lever and yellow cap. This can pose a pinch hazard.
- Repeat for the second swiveling magnet assembly on the other side of the base.
- When both magnets are fully OFF, there will be no attractive force between the base and the substrate material.

Commissioning:

The top surface of the 81001289 Magnet Base features one Universal Robots mounting pattern with pitch circle diameter (Ø=170mm) and two dowels (Ø=8mm), meant to interface with the UR10 and UR10e robot base flange.

The dowels are not installed when shipped and must be pressed in by the individual installing the robot to the mounting surface. The dowel transitional fit may be tight, so a small arbor press is recommended for dowel installation.

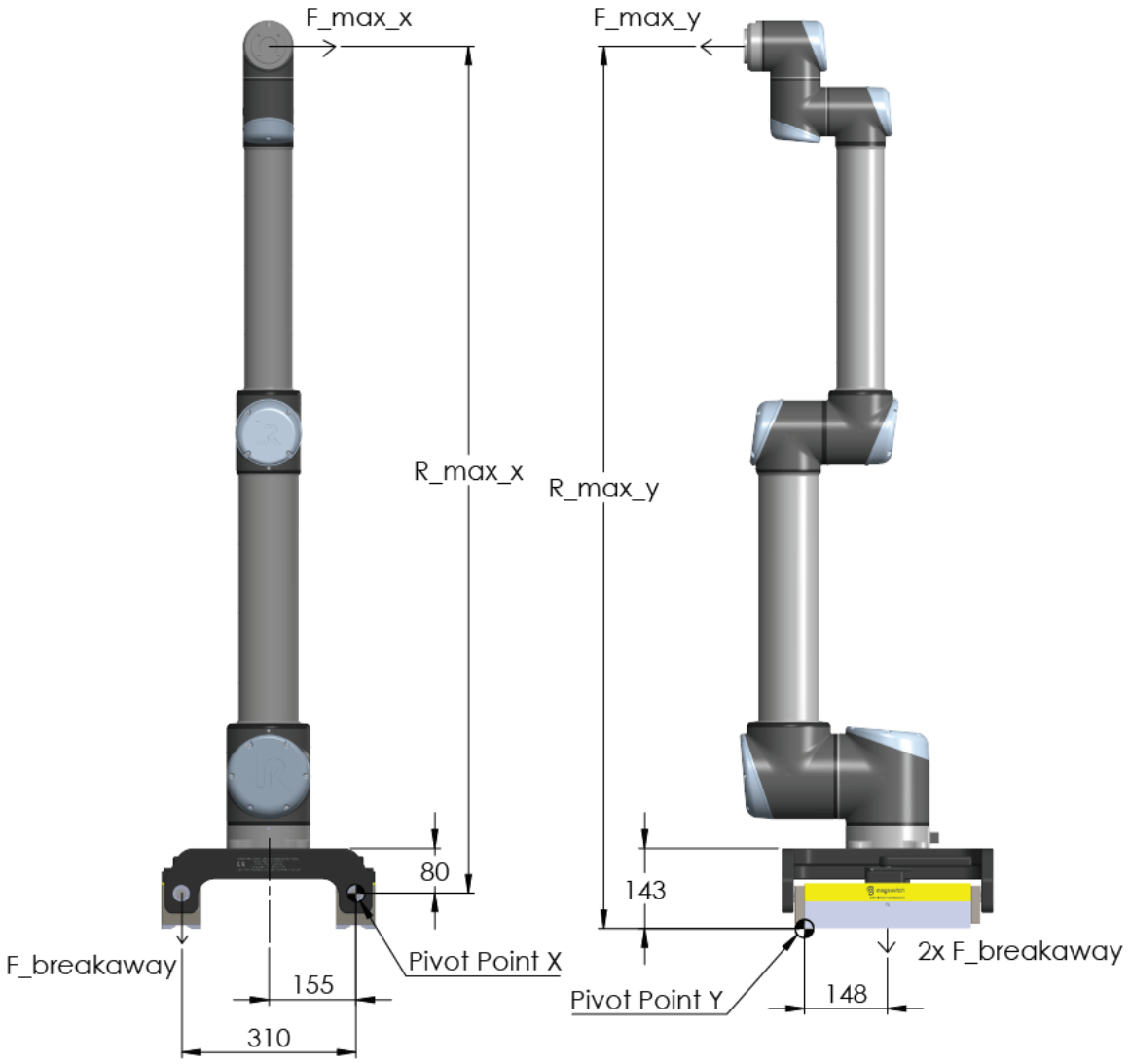
When installing the robot, ensure the magnet base is firmly adhered to a ferrous surface (or otherwise rigidly fixtured to prevent it from twisting or binding during installation). Position the robot over the top of the correct bolt pattern and dowel pins (or position the base under the robot in the proper orientation).

Install (4x) M8 socket head cap screws through the UR10 baseplate into the threaded holes at pitch circle diameter (Ø=170mm). Follow Universal Robots' guidance for proper torqueing of the screws to secure the robot to the magnetic base.

Capability:

Due to the high dynamic loads a robot will exert on the magnetic base during operation, it is recommended that the following procedure be applied to match the substrate (magnetic surface) thickness to the speed at which the robot is moving and the mass of the end effector and arm:

1. Determine the maximum dynamic force the robot will exert about the magnet base pivot points as shown below



2. Calculate the maximum exerted torque about the magnetic base pivot points
3. Use the dimensional data above and on the spec sheet (1101423) as required to infer the maximum breakaway force applied to each magnet array.
4. Multiply the calculated minimum breakaway force requirement by 2x to 5x depending on the certainty of the calculation. **NOTE: Universal Robots recommends a factor of safety of 10x**
    a. If the magnet is applied to surfaces covered in paint, rust, or scale, or if the substrate is significantly different than 1018 steel or is curved, please consult a Magswitch engineer for de-rating factors.

5. Refer to the table below for the maximum breakaway data for ONE swiveling magnet array.

Material Thickness - mm (in)	1.5 (0.059)	1.9 (0.075)	2.7 (0.106)	3 (0.118)	3.5 (0.138)	4.76 (0.187)	6.35 (0.250)	9.53 (0.375)	12.7 (0.500)	19.05 (0.750)
Maximum Force [1,2,4] - kg (lbs)	161.6 (356)	215.9 (476)	357.1 (787)	371.9 (820)	413.7 (912)	570 (1257)	879.4 (1939)	1044 (2302)	1092 (2407)	1125 (2480)

6. Size the thickness of the substrate according to the maximum force shown above, taking into account the safety/de-rating factor used in step 4 above.
7. If at any point the calculated breakaway force exceeds the material substrate you are capable of using, or if application variables beyond your control prevent you from using this straightforward calculation, please contact a Magswitch engineer to discuss your requirements.

Notes on Electrical Isolation:

This magnetic pivot base is outfitted with nonconductive bushings to electrically isolate the magnet arrays from the baseplate (and robot). This isolation layer is 1-2mm thick at a minimum. The electrical isolation is suitable for low voltages, and should not be relied upon for high voltage applications without further testing. Note that static charge voltage differential can exceed thousands of volts and may jump across the 2mm gap if allowed to build up.

Therefore, it is STRONGLY recommended that the magnet or substrate is grounded to earth to prevent the incidence of kilovolt transient voltage potentials.

Also note the four bolt heads visible from the sides of the base are electrically conductive to the magnet assembly/substrate. Take care to prevent the buildup of electrically conductive debris around these screws, which could eventually make electrical contact with the isolated baseplate.